# Section 6.6

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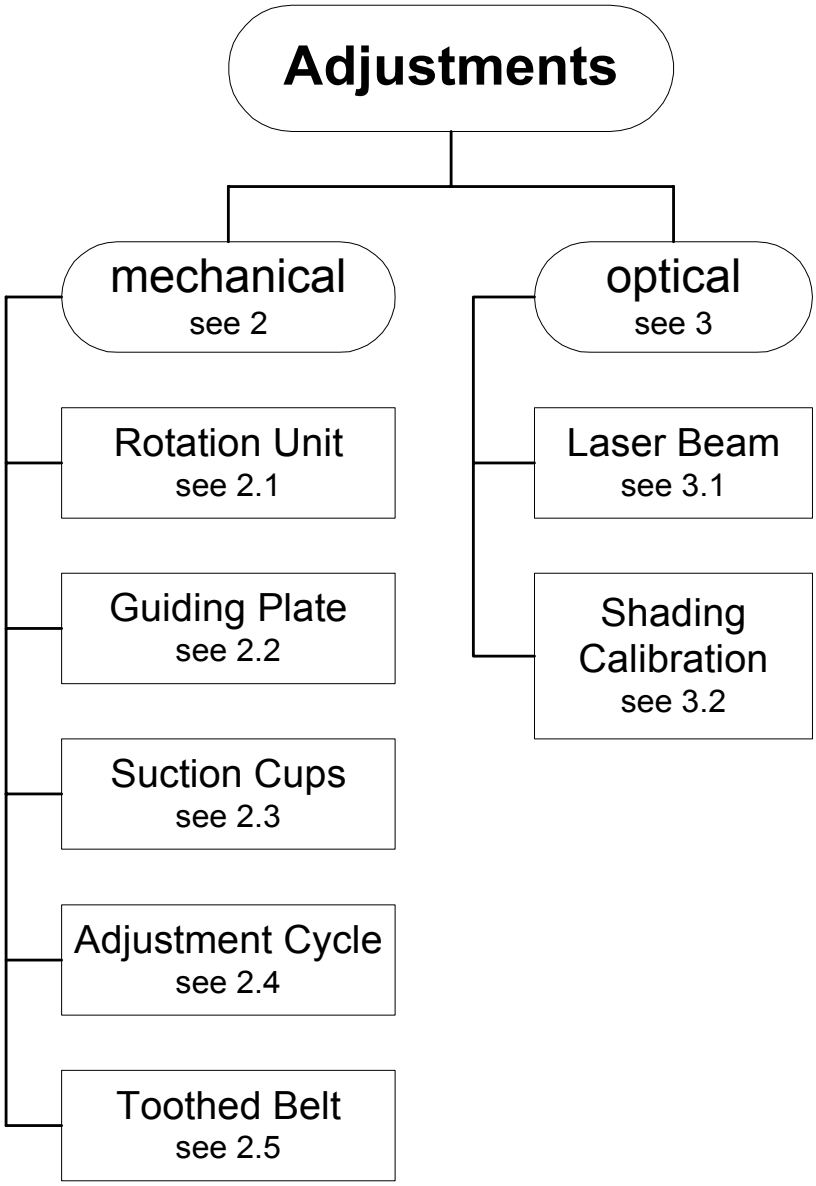
# 1 Overview of common Adjustments



# 2 Mechanical Adjustments

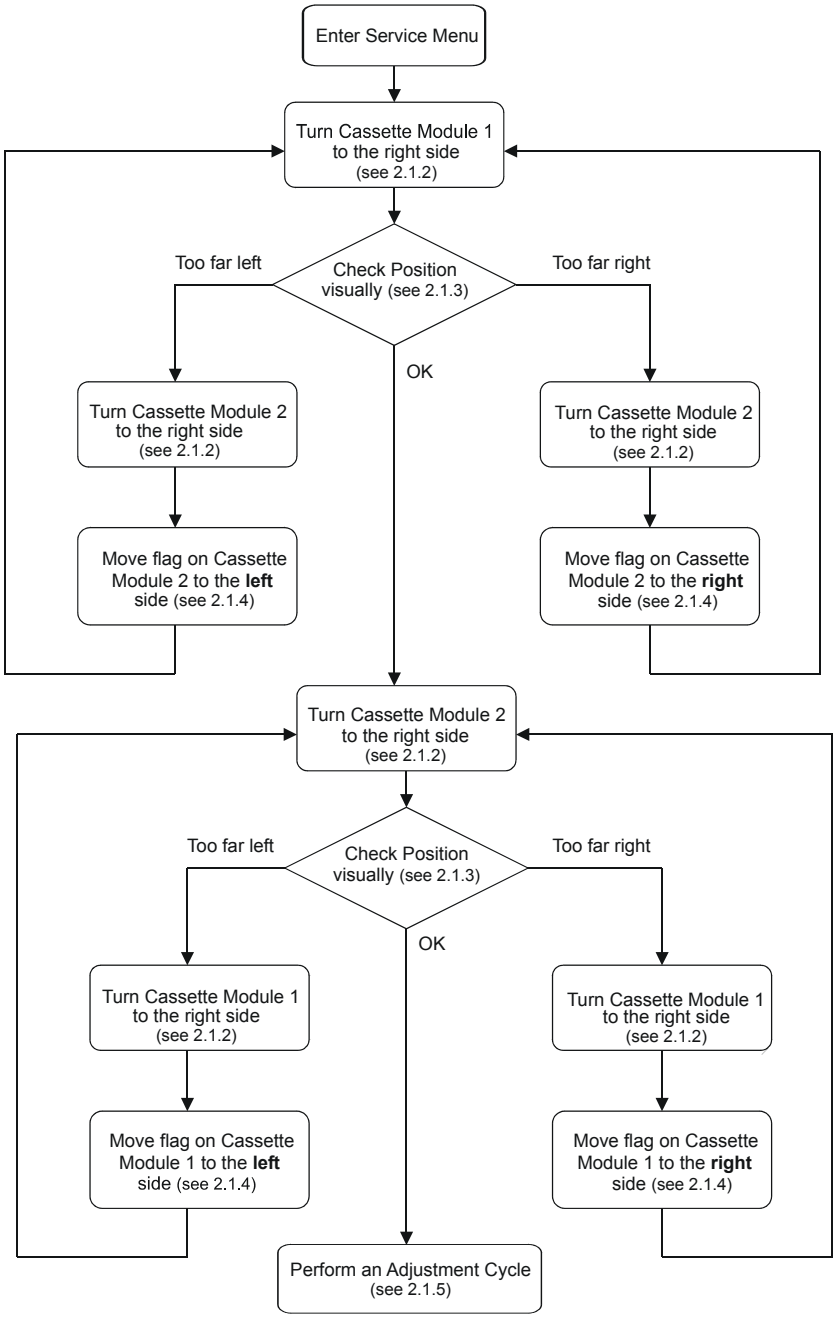
## 2.1 Adjustment of the Rotation Unit

### 2.1.1 General

Adjustment needs to be done after mounting the modification kit “light barrier flag” (CM+9.5145.9130.X) or if the light barrier flag is misadjusted (suction cups do not suck the IP properly).

For orientation, the two modules of the Cassette Unit are marked with stickers “Module 1” and “Module 2” on the side.

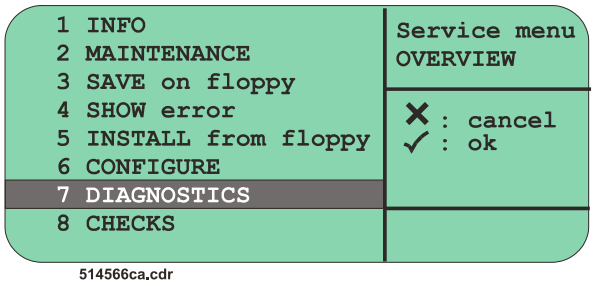
**Overview of the Procedure**


Enter Service Menu
Turn Cassette Module 1 to the right side (see 2.1.2)
Too far left
Check Position visually (see 2.1.3)
Too far right
OK
Turn Cassette Module 2 to the right side (see 2.1.2)
Move flag on Cassette Module 2 to the left side (see 2.1.4)
Turn Cassette Module 2 to the right side (see 2.1.2)
Move flag on Cassette Module 2 to the right side (see 2.1.4)
Turn Cassette Module 2 to the right side (see 2.1.2)
Too far left
Check Position visually (see 2.1.3)
Too far right
OK
Turn Cassette Module 1 to the right side (see 2.1.2)
Move flag on Cassette Module 1 to the left side (see 2.1.4)
Turn Cassette Module 1 to the right side (see 2.1.2)
Move flag on Cassette Module 1 to the right side (see 2.1.4)
Perform an Adjustment Cycle (see 2.1.5)

### 2.1.2 Turn Cassette Module 1 / 2 to the right side

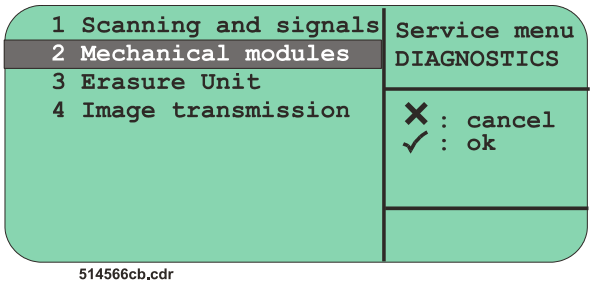
(1) Enter the Service menu

(2) Select
**<7 DIAGNOSTICS>**



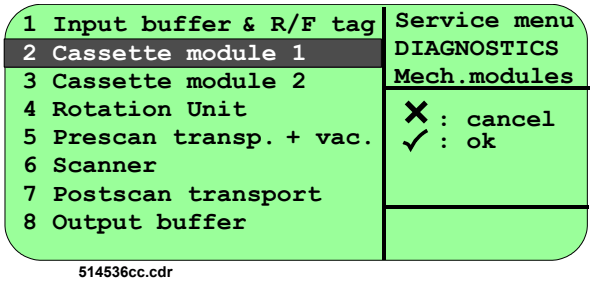
514566ca.cdr

(3) Select
**<2 Mechanical modules>**



514566cb.cdr

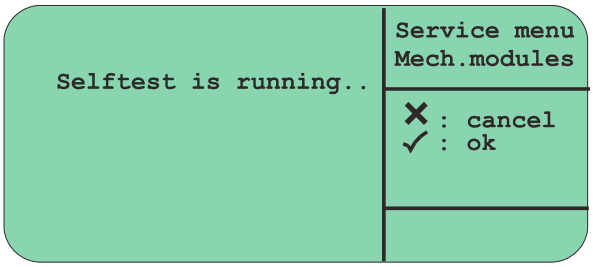
(4) Select
**<2 Cassette module 1>**
resp.
**<3 Cassette module 2>**
The selected module will be turned to the right side.



514536cc.cdr

(5) Press confirm key ✓

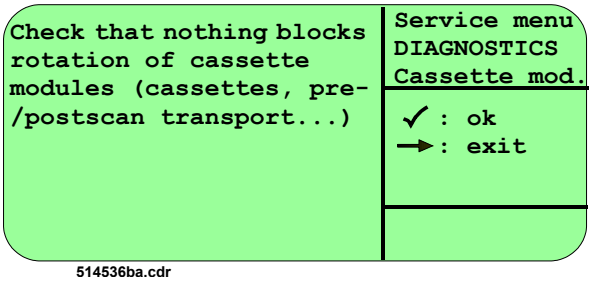
(6) **<Selftest is running..>** is shown at the display and the Diagnosis Software starts



514566cd.cdr

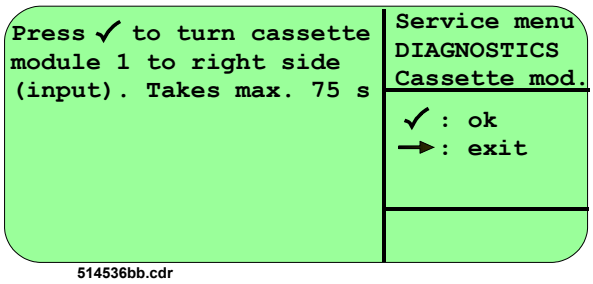
(7) Check if an error occurred

(8) Check that nothing blocks and press confirm key ✓

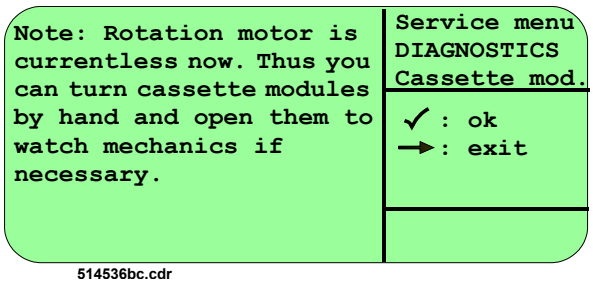


514536ba.cdr

(9) Press confirm key ✓
to start turning the selected cassette module




(10) Press arrow key to exit


Note: Rotation motor is currentless now. Thus you can turn cassette modules by hand and open them to watch mechanics if necessary.
Service menu
DIAGNOSTICS
Cassette mod.
✓ : ok
→ : exit
514536bc.cdr

### 2.1.3 Check Position visually

**Rough check of ideal position**

(1) Middle axis of the two cassette modules (1) and hole in the frame (2) are exactly on one line (3) (see Figure 2).

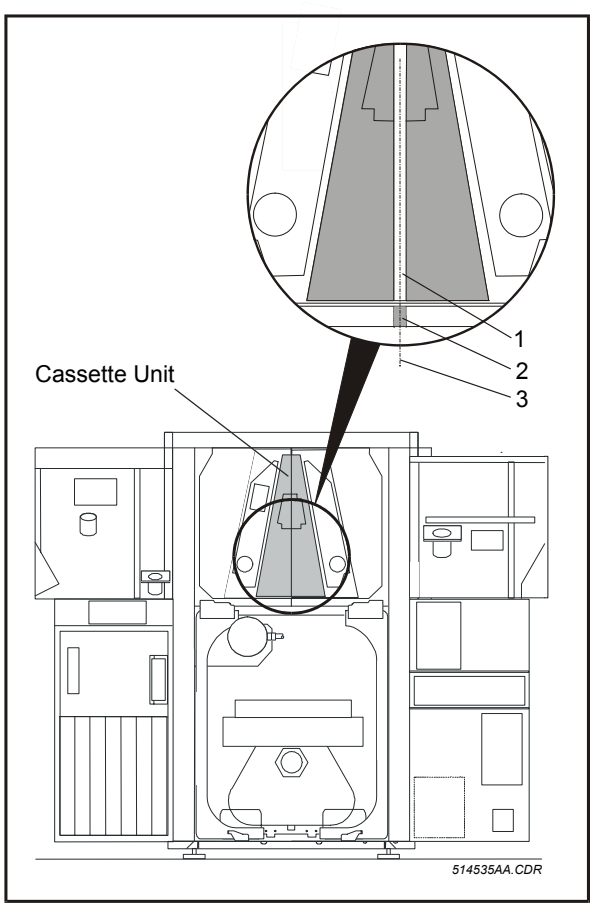



Figure 1

**Fine check of ideal position**

(2) Distance 1 = Distance 2 if flag is adjusted correctly (see Figure 2).

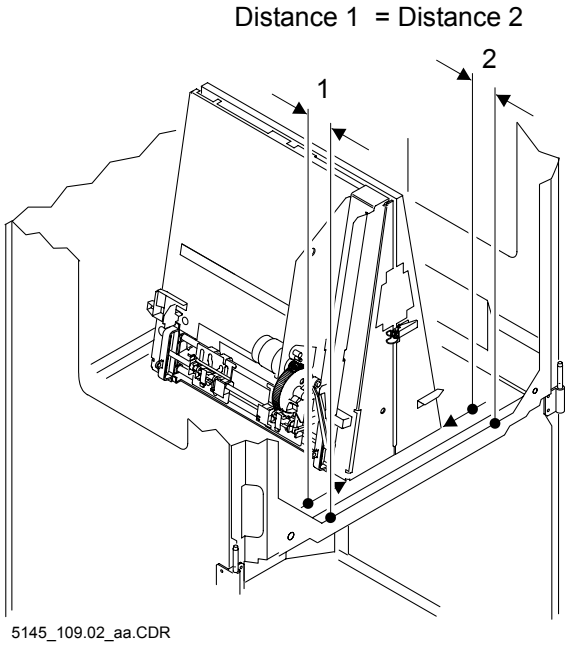



Figure 2

### 2.1.4 Move flag on Cassette Module 1 / 2 to left / right side

The movement of the flag is approximately equal to the difference of the middle axis of the cassette modules to the hole in the frame (e.g. if cassette module 1 is 2 mm too far left, move the flag on cassette module 2 for 2 mm to the left side).

(1) Loosen the two screws and move light barrier flag in corresponding direction.

(2) Tighten the screws.

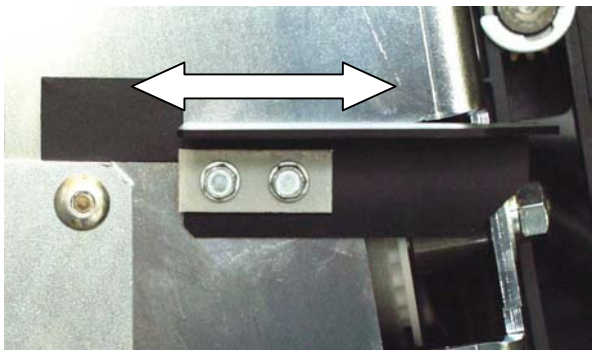


Figure 3

### 2.1.5 Perform Adjustment Cycle

Make sure that the positions of both cassette modules are correct before you perform an Adjustment Cyle (see 2.4 of this section).

## 2.2 Adjustment of Guiding Plate in Postscan Unit

### 2.2.1 General

If the guiding plate is not in perfect position the IP may be misguided. The robot carriage cannot insert the IP in the cassette correctly.

Error Message 22D60: “Cassette jam occurred during output in output buffer”

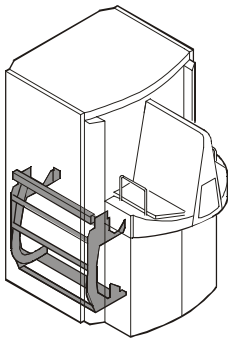


Figure 4

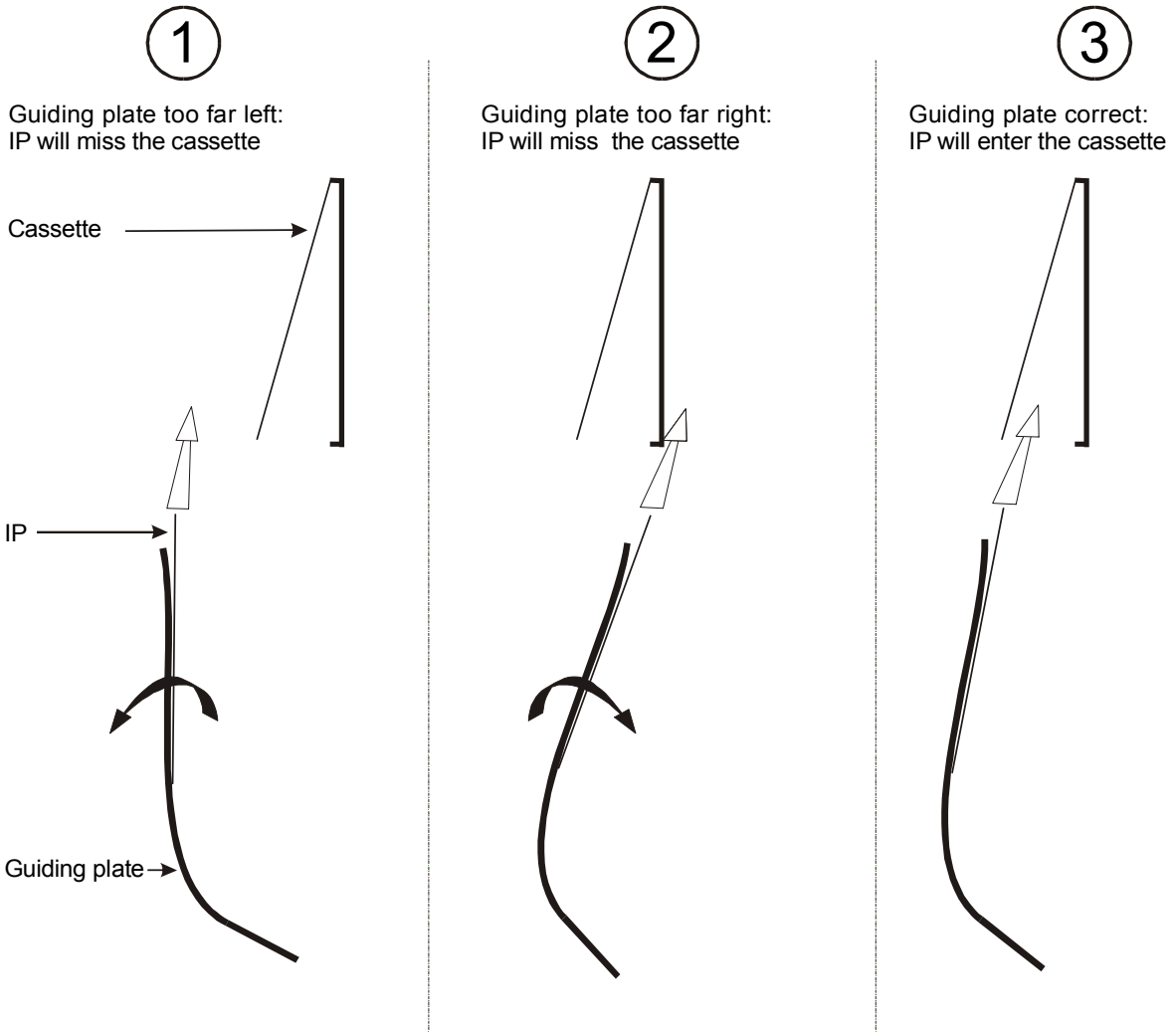



Figure 5

### 2.2.2 Adjustment Procedure

(1) Move the transport unit out of the chassis as far as possible.

(2) Loosen a little the four screws of the ledge that holds the guiding plate **1**. Two at the front end and two at the back end of the ledge. The screws at the back end are loosened best with an open-end wrench (7mm).

(3) Put the suction cups of the robot carriage in upward position **2**.

(4) Move the robot carriage manually upwards to the very top **3**.

(5) During the last 10 cm of the upward movement the space between the white plastic gearwheel and the guiding plate has to be examined (see Figure 5).

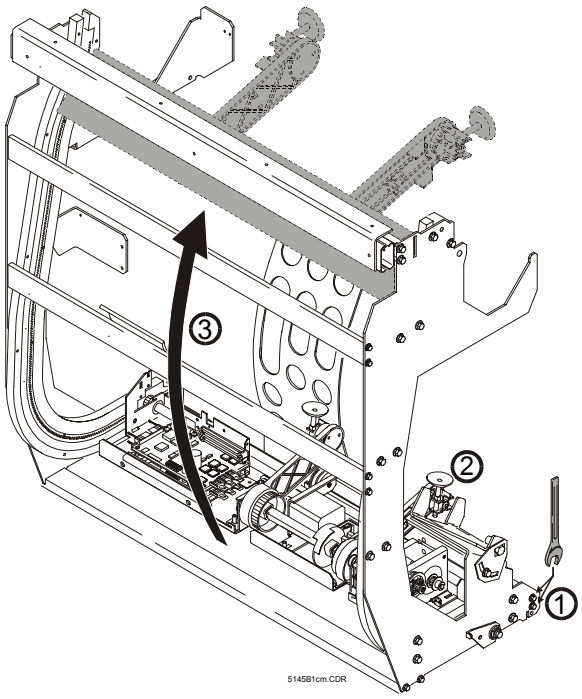


Figure 6

(6) While the robot carriage is being moved to the very top the plastic gear wheel **A** comes very close to the guiding plate **B**.

(7) When the plastic gear wheel reaches the closest point to the guiding plate, the space should not exceed 1 or 2 mm.

(8) If the guiding plate touches the plastic gear wheel, touch the bottom ledge of the guiding plate **1** and move the guiding plate away from the plastic gear wheel.

(9) If the space between guiding plate and plastic gear wheel is more than 2 mm, touch the bottom ledge of the guiding plate **1** and move the guiding plate towards the plastic gear wheel.

(10) When the perfect space is reached (1 or 2 mm), fix one screw at the front of the ledge and check the distance again.

(11) If the space is different to 1 or 2 mm, readjust the guiding plate.

(12) Repeat readjustment until the screws are fixed and the perfect space is reached.

(13) Move the IP transport unit back in its work position.

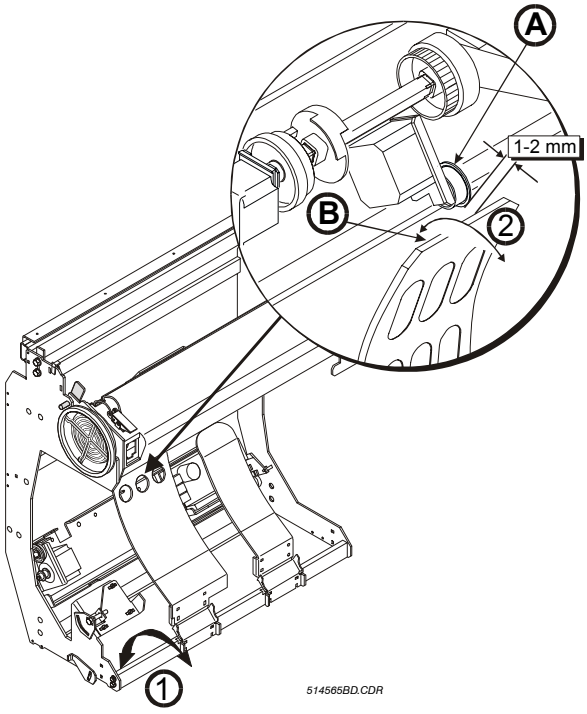


Figure 7

## 2.3 Adjustment of Suction Cups

Problems with insufficient vacuum at the image plate can be caused by non parallel suction cups. To check if the suction cups are parallel, work out the following steps:

### 2.3.1 Standard Robot

(1) Pull out the IP transport unit of the digitizer to its stop.
(2) Move the robot manually half way up (see Figure 6)
(3) Check visually if the suction cups are parallel (as reference use the guiding plate) and if necessary readjust the suction arms by moving the arms manually into the right position.

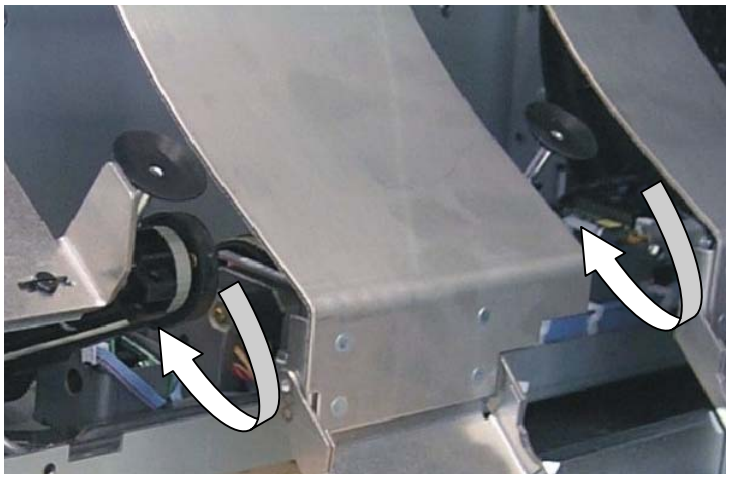


Figure 8

### 2.3.2 Advanced Robot

(1) Pull out the IP transport unit of the digitizer to its stop.
(2) Move the robot manually half way up (see Figure 6)
(3) Check if the rib of the suction cup holder of the **input** robot corresponds with the **upper** recess of the suction arm.

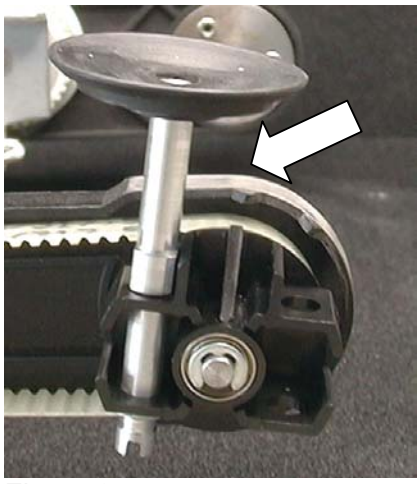


Figure 9

(4) Check if the rib of the suction cup holder of the **output** robot corresponds with the **lower** recess of the suction arm.

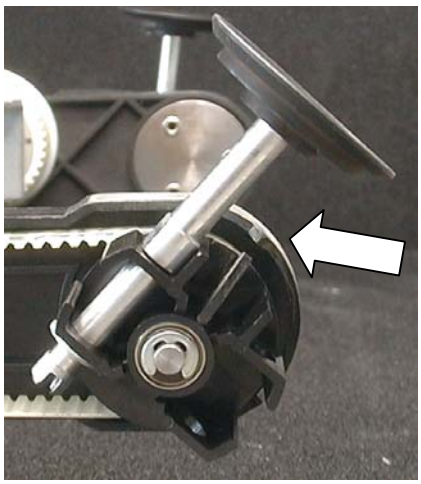


Figure 10

## 2.4 Adjustment Cycle

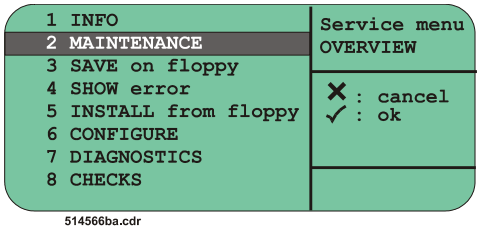
Before an adjustment cycle is carried out, make sure that both cassette modules of the rotation unit are adjusted correctly (see 2.1 of this section).

### 2.4.1 Standard Robot and Software Version COP_1215

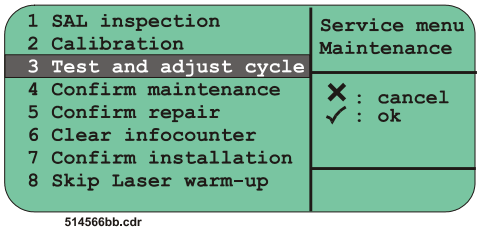
An adjustment cycle is necessary to define the position of the suction cups and the return position of the IP. It is only available with Software version COP_1215 or higher.

(1) Enter the Service menu

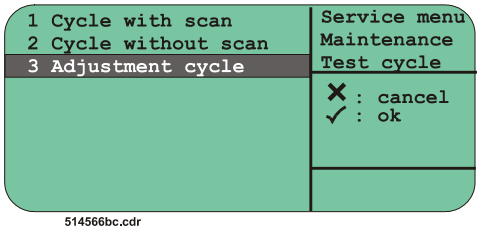
(2) Select
**<2 MAINTENANCE>**




(3) Select
**<3 Test and adjust cycle>**




(4) Select
**<3 Adjustment cycle>**




(1) Follow the instructions on the display.

(2) The return position of the cassette has to be adjusted manually. For this work you need a small flashlight.
Between the edge of the IP and the edge of the cassette a small gap of approximately 1 mm to the side has to remain.

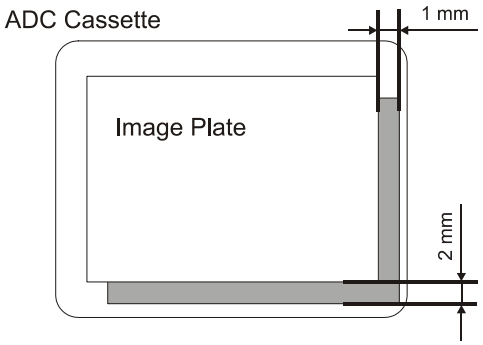



Figure 11

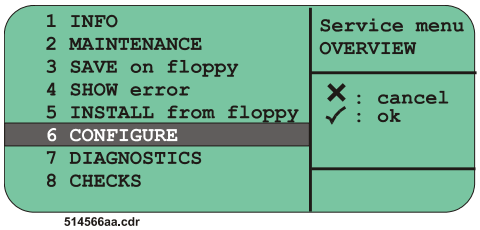
(3) Make a new back up floppy and label it with: Serial Number, Date and Software version.

Do not use the old back up again!

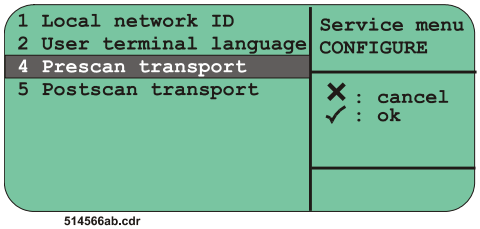
### 2.4.2 Standard Robot and Software Version COP_1308

(1) Enter the Service menu

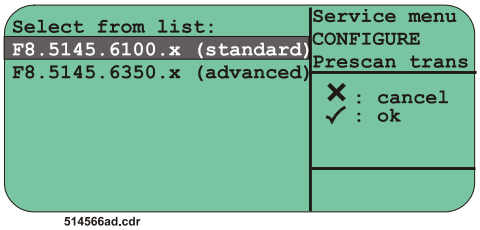
(2) Select
**<6 CONFIGURE>**




(3) Select
**<4 Prescan transport>**
respectively
**<5 Postscan transport>**

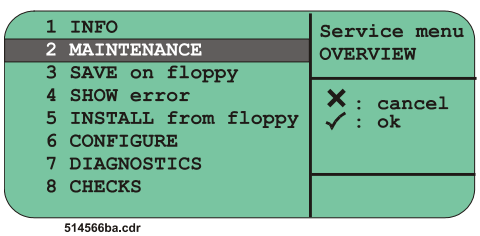



(4) Select
**<F8.5145.6100.x(standard)>**
and confirm the selection by pressing the confirm key ✓

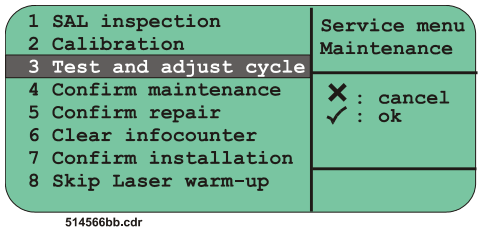



(5) The Service menu appears

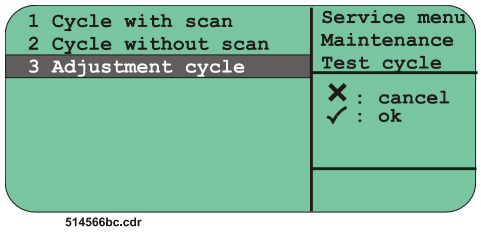
(6) Select
**<2 MAINTENANCE>**



(7) Select
**<3 Test and adjust cycle>**

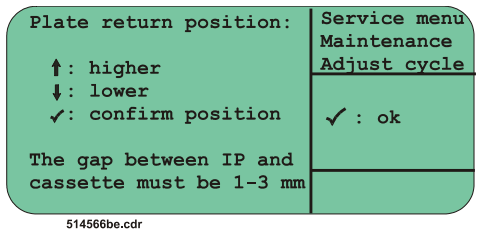



(8) Select
**<3 Adjustment cycle>**




(9) Start the adjustment cycle by inserting a large format ADC Cassette

(10) The vertical adjustment is done by pressing the arrow keys at the keypad of the digitizer.




(11) Check the horizontal position of the IP inside the Cassette by moving the IP carefully by hand while the suction cups are still holding the IP.
The ideal position of the IP is in the middle of the cassette or with a tendency to the right side of the cassette (towards the front of the digitizer). Tolerance to the side is 1 mm.

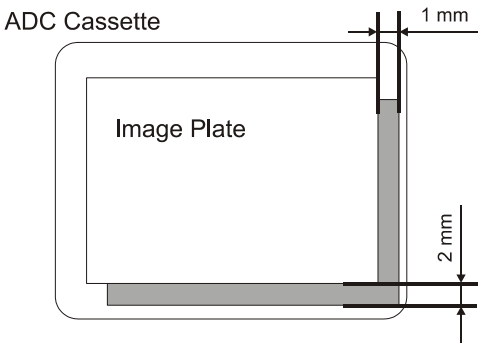



Figure 12

(12) If the IP is not in the right position you have to turn the adjustment screw:

- Mark the start position on the screw with a permanent marker.
- One complete turn is equivalent to 1 mm change in position of the IP in the Cassette.
- Turn the adjustment screw clockwise to position the IP closer to the right cassette edge.
- Turn the adjustment screw counter clockwise to position the IP closer to the left cassette edge.

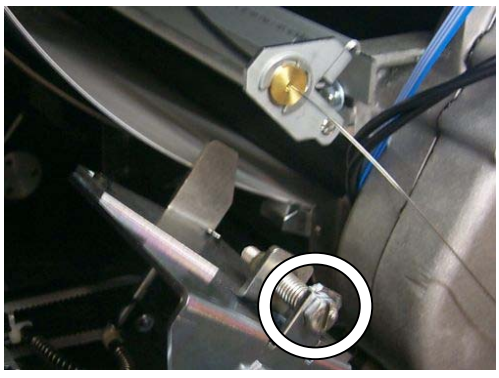
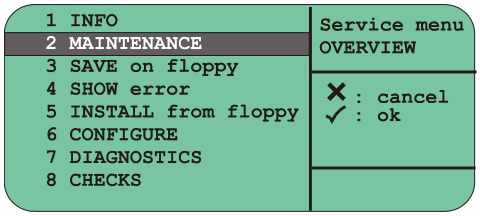
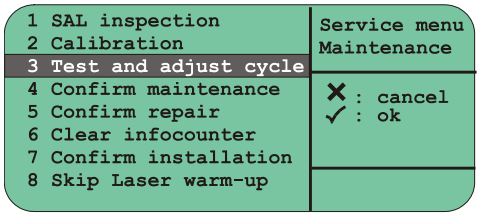


Figure 13

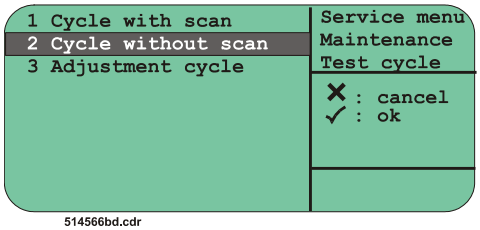
(13) Select
**<2 MAINTENANCE>**




(14) Select
**<3 Test and adjust cycle>**




(15) Select
**<2 Cycle without scan>**




(16) Repeat once again **<Cycle without scan>** because after the first cycle the other cassette unit picked up the cassette.

(17) If the position is **ok**, repeat the procedure **<Cycle without scan>** three times with a cassette format 35 x 43 cm and three times with 18 x 24 cm.

If the position is **not ok**, you have to find a compromise for both units. Turn the adjustment screw corresponding to the IP position but remember, it will also affect the other unit. Redo (12) to (16) until the position is ok for both units (see above).

(18) Create a new backup floppy to save the settings for the vertical adjustment of the advanced robot.

### 2.4.3 Advanced Robots and Software Version COP_1308

#### 2.4.3.1 General

Prerequisite to run an advanced transport robot (Prescan robot CM+9.5145.6350.0 and Postscan robot CM+9.5145.6150.0) is at least Software version COP_1308. An advanced robot should be installed when the belts of a standard robot need to be replaced often or the whole robot needs to be replaced, because the standard modification kit is no longer delivered.

**Replacement:**

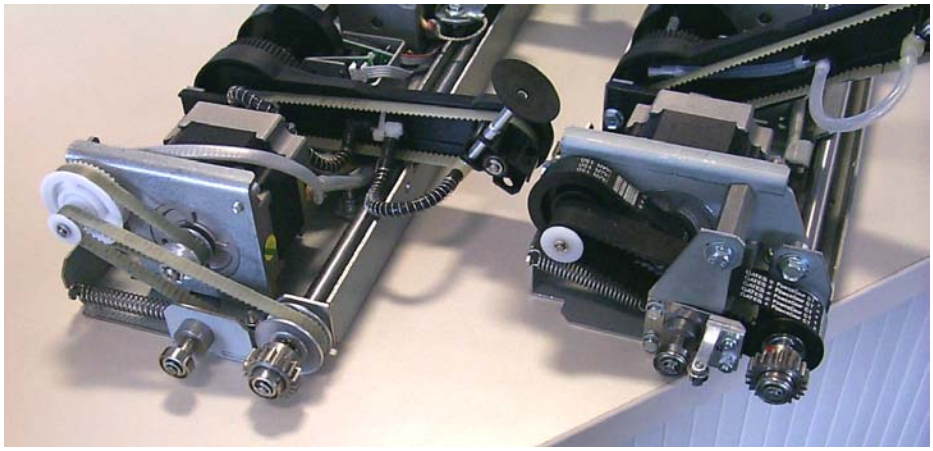


Figure 14
Prescan transport robot standard and advanced

This documentation describes only the adjustment procedure. For the replacement of the robot see Technical Documentation ADC Compact (2nd Edition) Section 6.5.

**Position of the Units:**

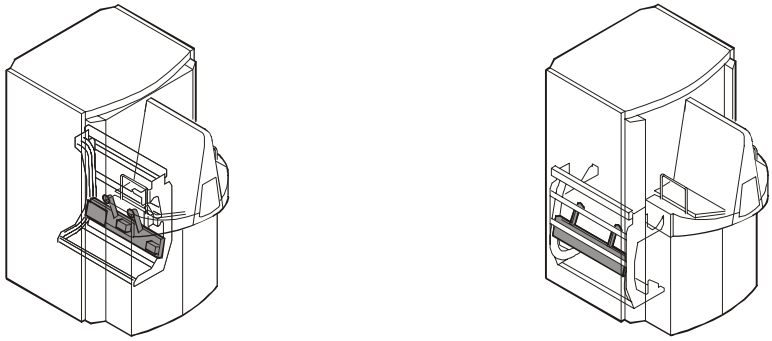


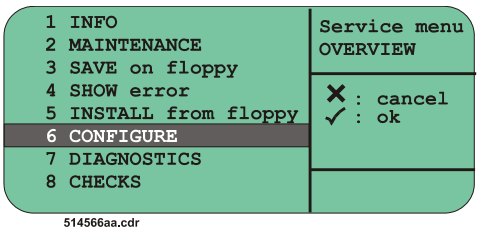
Figure 15
Prescan transport robot Postscan transport robot

After you replaced a standard transport robot by an advanced transport robot carry out an adjustment. This procedure is necessary to reach again an exact positioning of the IP in the cassette.

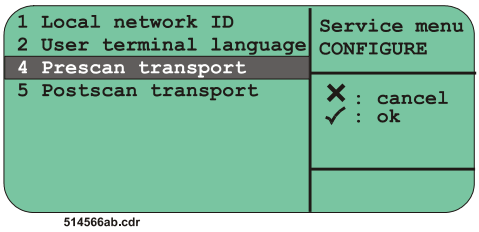
2.4.3.2 Adjustment Procedure

(1) Enter the Service menu

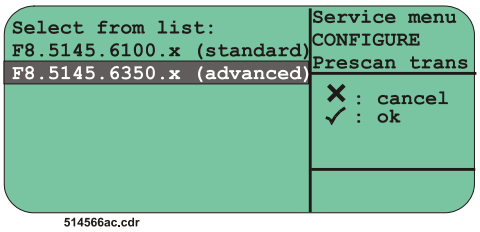
(2) Select
**<6 CONFIGURE>**




(3) Select
**<4 Prescan transport>**
respectively
**<5 Postscan transport>**




(4) Select
**<F8.5145.6350.0(advanced)>**
and confirm the selection by pressing the confirm key ✓




(5) Repeat the adjustment procedure like above for Standard Robot from (5) to (18)

## 2.5 Adjustment of Toothed Belt in Transport Units

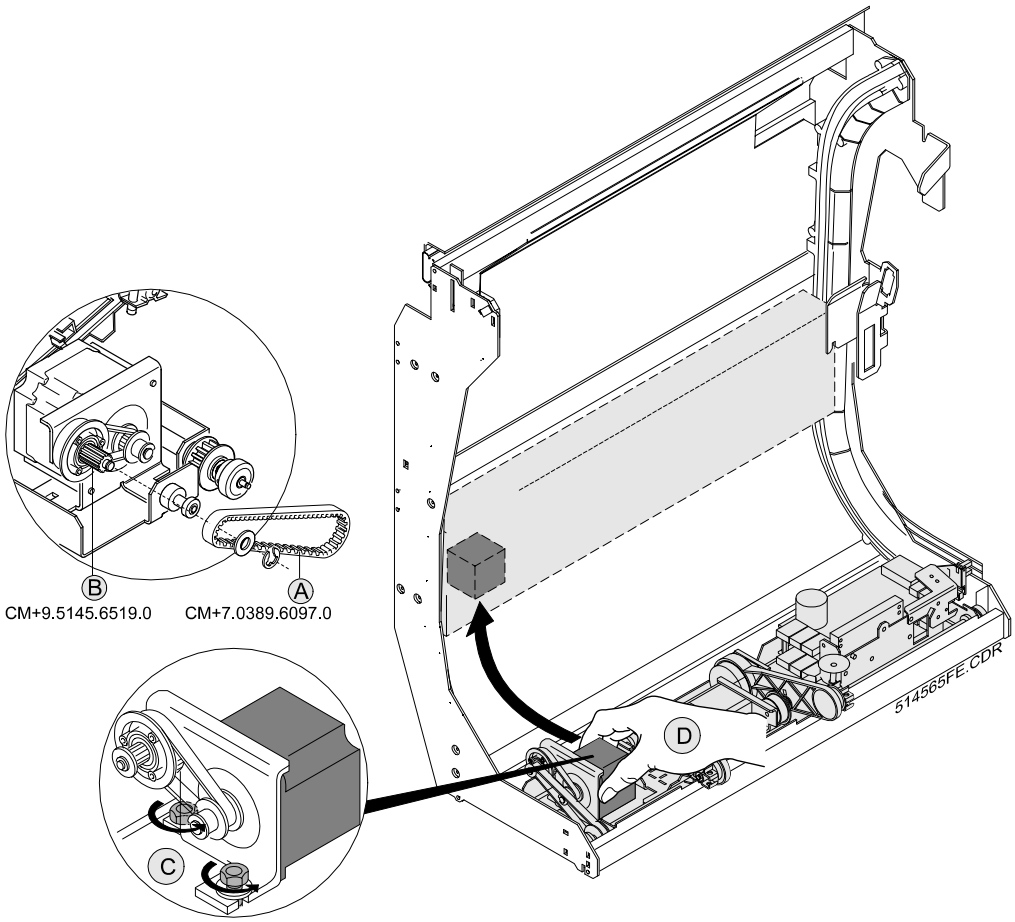



Figure 16

After the replacement of a toothed belt **A**, and if necessary also of the toothed belt pulley **B**, an adjustment is needed:

(1) Loosen the screw connection **C** by one turn.
(2) Push the robot up on its motor **D**, by approximately 30 cm.
(3) Tighten the motor screw connection **C** again.
(4) Bring the robot back into the initial position.

# 3 Optical Adjustments

## 3.1 Adjustment of the Laser Beam

### 3.1.1 Principle

1 Galvo mirror
2 Small scan width: slits **4** are not illuminated
3 Broad scan width: slits **4** are illuminated, caused by operation with highest amplitude of the galvo which can be set with the command **<Laser beam position>**
4 Slits on the PIN diodes plate
5 Optical fibers
6 Fiber spots: laser beam position is correct, when both spots are on (red light visible)

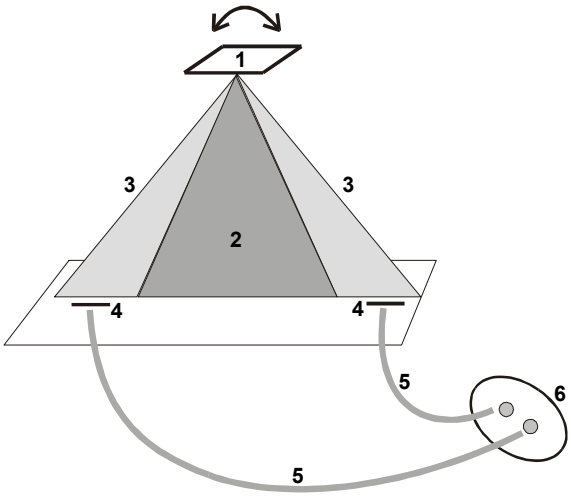



Figure 17

### 3.1.2 Adjustment Procedure

It is possible that the adjustment screws of the galvo are defective, so it would be advisable to hold a galvomount CM+9.5145.2910.2 on stock.
Lubricate the adjustment screws with “Isoflex Topas” if they do not turn smoothly.

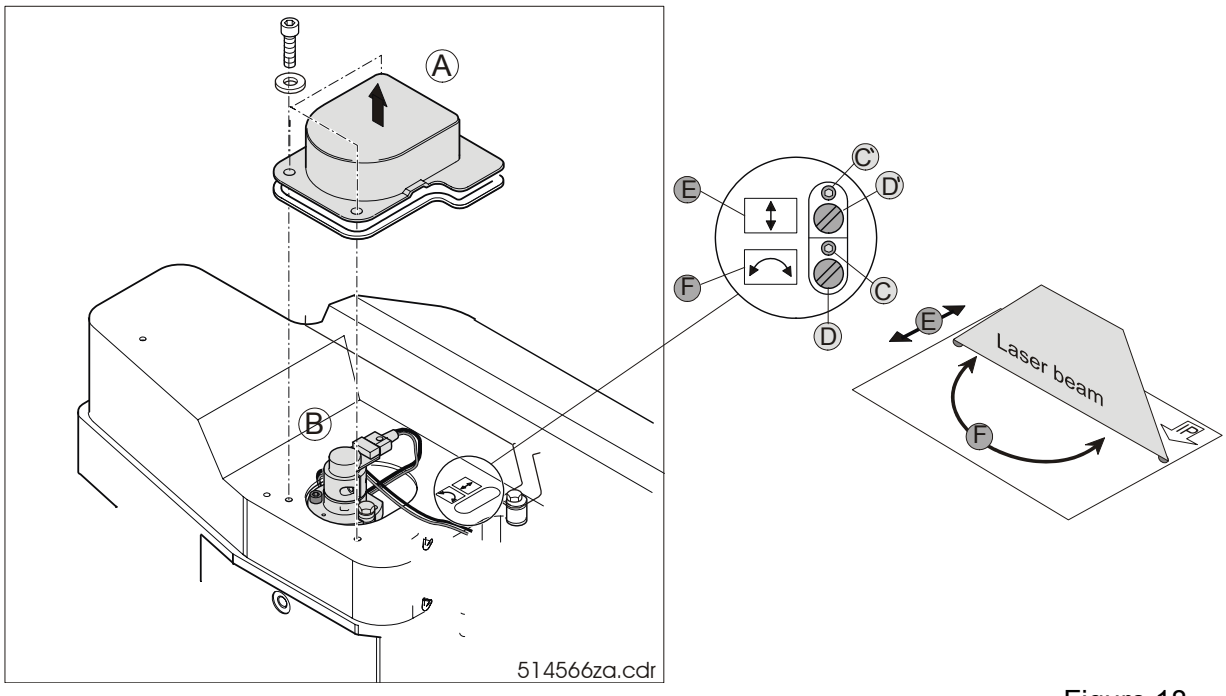



Figure 18

(1) Unscrew the dust cap **A** with an Allen key 2.5 mm from the galvo **B**.
(2) Loosen the screws **C/C'** slightly with an Allen key 2 mm.
(3) Adjust the laser beam turning **D/D'** with a Phillips screwdriver.
(4) Tighten the screws **C/C'** again.
(5) The fiber spots should be both on.

3.1.2.1 Fiber Spots not on

If the fiber spots are not on, the height-adjustment **E** and the side-adjustment **F** have to be varied until the fiber spots shine simultaneously.

E

F

(1) If the laser beam is completely misadjusted (e.g. after the galvo mount has been replaced) turn the height-adjustment screw until one fiber spot turns red.
(2) Turn the side-adjustment screw until the second fiber spot turns red.

3.1.2.2 First Fiber Spot goes out again

It happens quite often that the first fiber spot goes out again. If this is the case, go on as follows:

(1) Turn the side-adjustment screw **F** until the second fiber spot turns red. Keep on turning until the second fiber spot appears a second time.
(2) Remember the amount of turns between the two control spots and turn the screw half way back.
(3) Do the height-adjustment **E** once again until both fiber spots go on.
(4) Mount the dust cap **A**.
(5) Push the scan unit back to its place slowly and lock the safety screws again.
(6) Close the doors.

## 3.2 Shading Calibration

### 3.2.1 Definition

Calibration is an assignment of the relation between indicated value on a measuring instrument towards the true value of the quantity to be measured. The so called shading calibration (pixel wise line calibration) is the only kind of calibration which needs to be done in the field.
This calibration evens out differences in the transmission behavior of the glass fibers. Thereby each scanned pixel in a line is corrected arithmetically by its corresponding correction value (shading correction). The intention of calibration is to get a homogeneous input signal.

### 3.2.2 Checklist for Cases of Calibration

Before calibrating the digitizer, do always print and compare a `flatfield cal`. Details about exposure and evaluation of flat field and test sheet, see Section 12.

| Symptom | Defect | Solution |
|---|---|---|
| Exchange of the galvometer | New galvometer needs to be adapted to the digitizer | Carry out a calibration |
| Exchange of the photomultiplier | New photomulitplier needs to be adapted to the digitizer | Carry out a calibration |
| Exchange of the scan unit | New scan unit can be misadjusted | Check image quality with a flat field:<br>• If the quality is ok, you do not have to carry out any adjustment<br>• If the image has stripes in slow-scan direction, carry out a calibration |
| Exchange of the laser | New laser can be misadjusted | Check image quality with a flat field:<br>• If the quality is ok, you do not have to carry out any adjustment<br>• If the image has stripes in slow-scan direction, carry out a calibration |
| Changes at the galvometer adjustment screw | Position of the laser beam is affected and can be misadjusted | Check image quality with a flat field:<br>• If the quality is ok, you do not have to carry out any adjustment<br>• If the image has stripes in slow-scan direction, carry out a calibration |

| | | |
|---|---|---|
| Inhomogeneous images with lines in slow-scan direction | • Laser beam position can be misadjusted<br>• Scan area can be dusty<br>• Relation between correction factor and glass fiber can be different | • Check position of the laser beam and adjust it if necessary<br>• Check if there is dust in the scan area and clean it with the scan brush if necessary<br>• Check the image quality again and if it is still inhomogeneous carry out a calibration |
| Inhomogeneous images with two-dimensional errors | X-ray device causes inhomogenities | Cannot be solved by an adjustment of the digitizer! |

### 3.2.3 Calibration Procedure

For the calibration procedure you need a copper filter and an erased image plate, which is dry, clean and immaculate. The cassette with the image plate inside needs not to be identified. To calibrate for all image plate formats you can either use one image plate (with the format 43 x 35 cm or 35 x 35 cm) or one image plate of each format.

It is recommended to use only one image plate (format 43 x 35 cm or 35 x 35 cm). So this image plate can be reserved for calibration procedures.

#### 3.2.3.1 Exposure of the Cassette

The cassette must be exposed with 20 µGy in total. To achieve a good evenness of the exposure it is recommended to expose two times with 10 µGy by turning the cassette 180° between the first and the second exposure.

Dose of 10 µGy can be achieved with:
- 7.5 mAs
- 75 kV
- 1.3 m distance
- large focus
- 1.5 mm copper filter

Use a dosimeter to measure the dose!

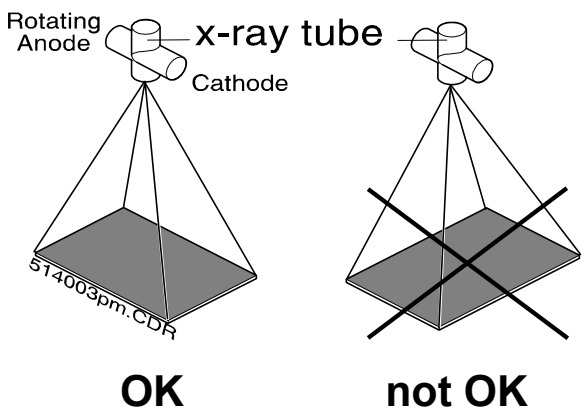



Figure 19

The entire image plate must be fully exposed! No collimating is needed!

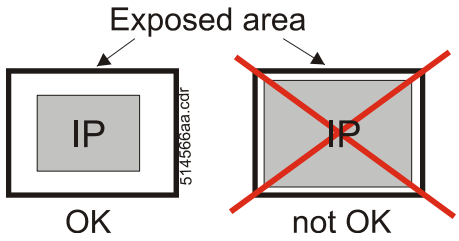
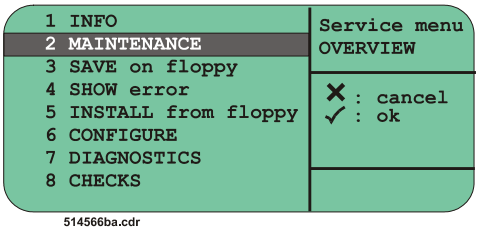



Figure 20

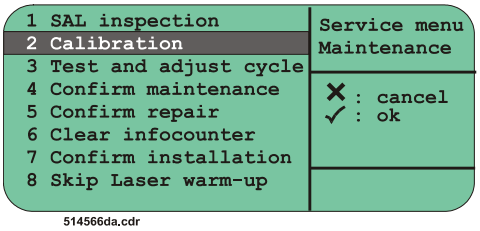
### 3.2.3.2 Start Calibration Routine

(1) Enter the Service menu

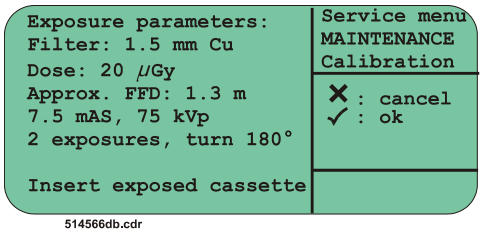
(2) Select
**<2 MAINTENANCE>**




(3) Select
**<2 Calibration>**




(4) Parameters are shown on the display




(5) Insert exposed cassette, select a format and the calibration starts automatically

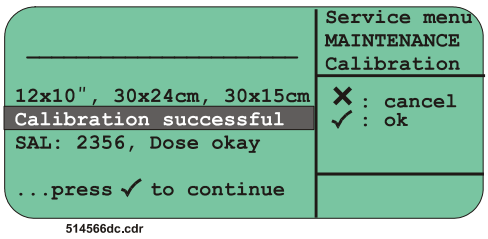
(6) Follow the instructions on the display

### 3.2.4 Results of the Calibration

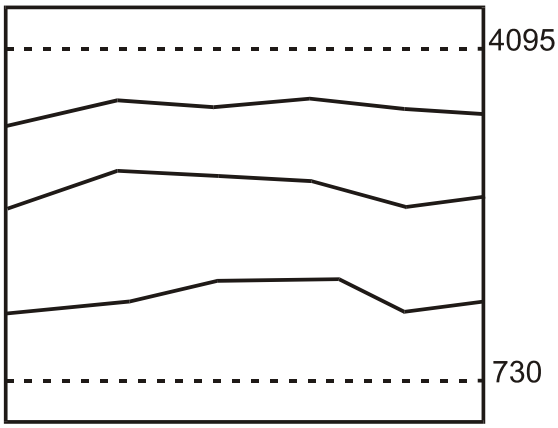
The Scan Average Level (SAL) is the digital value (gray scale) of a pixel and is one of the criteria for a successful calibration. The values during a calibration must be in a range of approximately 730 to 4095 with a 12 bit adjustment.

#### 3.2.4.1 Successful Calibration

(1) Info message pops up with a double beep and calibration line is stored automatically



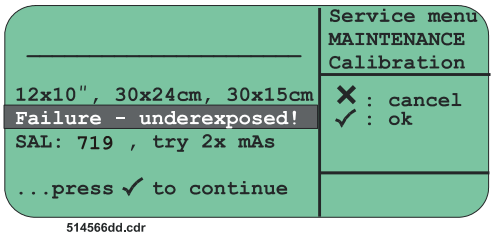

(2) Redo the calibration for the other formats




Calibration curves for the three speed classes 600, 200 and 75

#### 3.2.4.2 Image Plate Underexposed

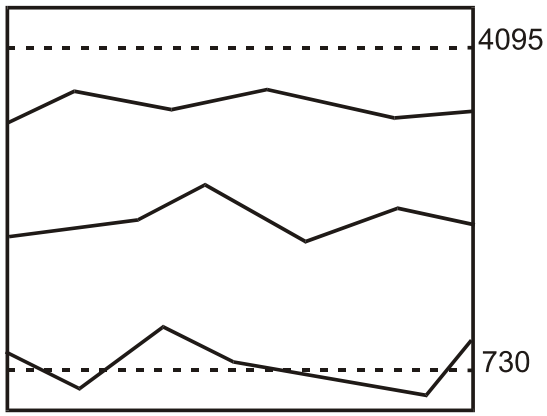
(1) Failure message pops up with a long beep




(2) Increase the exposure dose and redo the calibration.

(3) If it is still underexposed check the following digitizer settings:

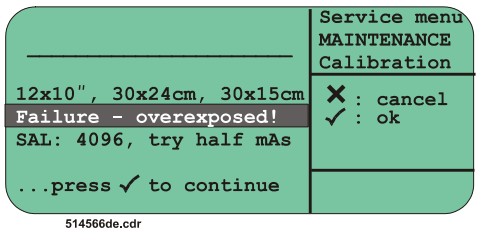
- Correct installation of the photomultiplier floppy after a replacement
- Correct installation of the backup floppy after software installation with formatting boot floppy
- Check content of the scnxx00.a00 file on D: partition. It must contain mfa and mfb values! If these values are equal to default (mfa 2.9 and mfb 0.27) it can be, that the correct values have been lost at a service interaction.




The maximum value of the lines in the SC75 field must not be below 730 (12 bit).

### 3.2.4.3 Image Plate Overexposed

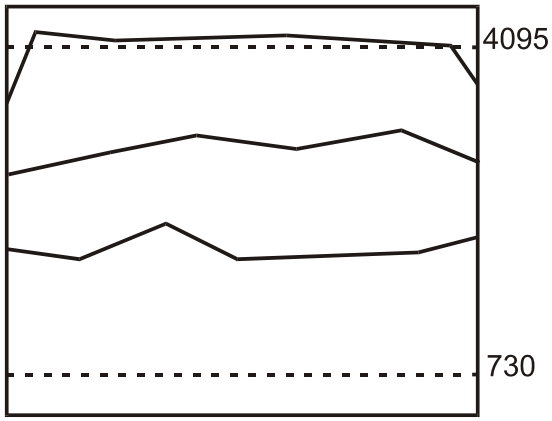
(1) Failure message pops up with a long beep




(2) Reduce the exposure dose and redo the calibration.

(3) If it is still overexposed check the following digitizer settings:

- Correct installation of the photomultiplier floppy after a replacement
- Correct offset-count, which is part of the galvo setting, can be set back by a hard disk replacement. Original offset-count is needed, ask therefore for the original production settings
- Correct installation of the backup floppy after software installation with formatting boot floppy
- Check content of the scnxx00.a00 file on D: partition. It must contain mfa and mfb values! If the values are equal to default (mfa 2.9 and mfb 0.27) it can be, that the correct values have been lost at a service interaction.

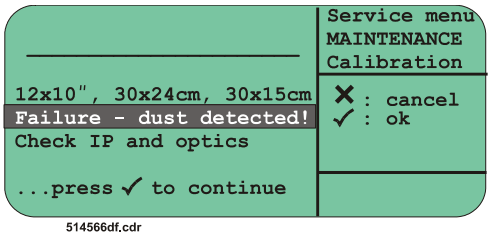



The maximum value of the lines in the SC600 field must not exceed 4094 (12 bit).

The optimal value for the SC200 field is around 1800 (12 bit).

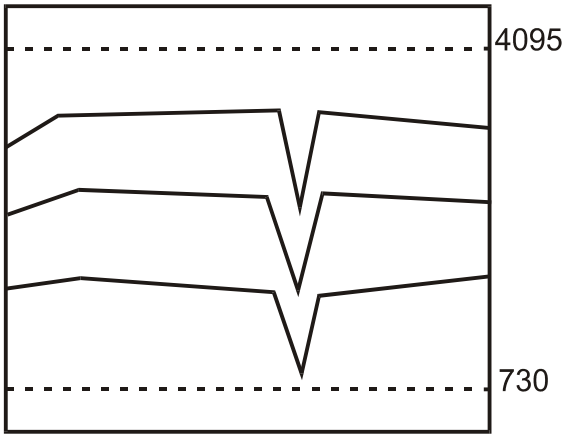
### 3.2.4.4 Dust detected

(1) Failure message pops up with a long beep




If the difference between successive pixels is over a certain limit this message occurs

(2) Clean the fibre optics with the built-in brush




Very deep peaks are shown, when a dust particle is detected

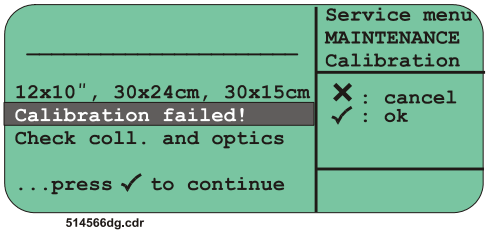
(3) Check if the exposure was really flat field

(4) Check the image plate for scratches in slow-scan direction

(5) If none of these actions show success, analyse the flat field image at the workstation and go on there.

### 3.2.4.5 Calibration failed

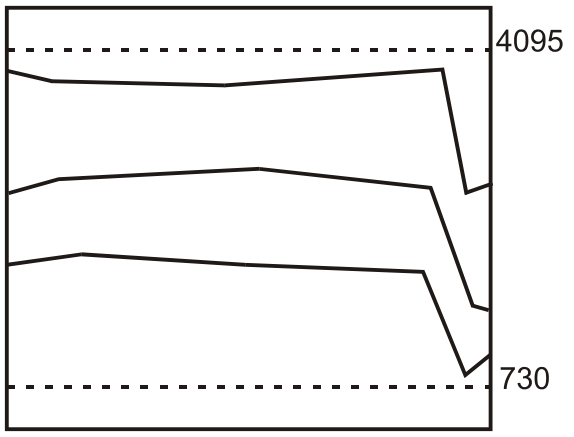
(1) Failure message pops up with a long beep




Display in case e.g. the cassette was not entirely exposed or the optics is not properly adjusted!

(2) Check the suggested parts and aspects shown on the display

(3) Make sure that the image plate was exposed without collimation




Curves of a failed calibration with an image plate exposed with collimation

(4) Check the image plate for scratches in slow-scan direction

(5) If none of these actions show success, check for ERR entries with REM tool (terminal mode to device)

# 4 Uncommon Adjustments

## 4.1 Adjustment of the Vacuum Pump

Do this adjustment only when it is clear that the Vacuum Pump is misadjusted!

If the lock nut **C** is not secured with lacquer, you have to check and possibly adjust the vacuum pump.

A Pump wheel
B Adjustment plate
C Lock nut
D Electrical cables

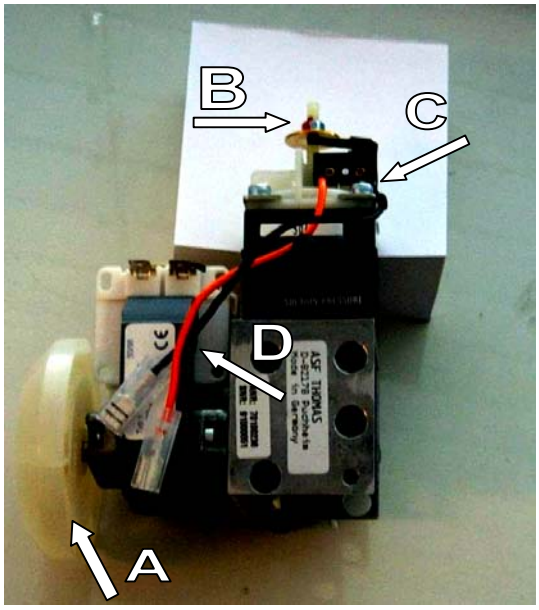



Figure 21

E Suction port
F Pressure port
S Switch

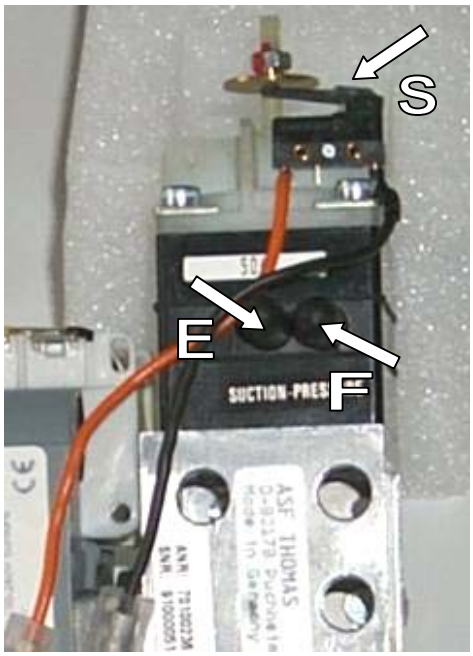



Figure 22

### 4.1.1 Adjustment Setup

G Vacuum pump
H Vacuum tester
J Ohmmeter

(1) Connect the vacuum tester and the suction port with a vacuum hose.
(2) Connect the electrical cables and the ohmmeter.

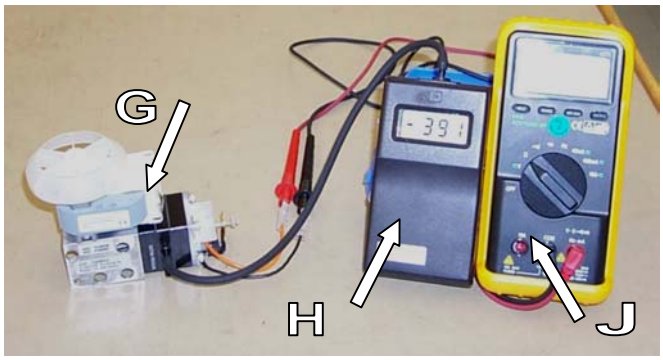



Figure 23

### 4.1.2 Adjustment Procedure

(1) Turn the wheel until the required value of 400 mbar ± 50mbar is reached.

Figure 24

(2) Turn the adjustment plate **B** left until the switch **M** is actuated and the ohmmeter switches to high impedance.

(3) Fix the adjustment plate with the lock nut **C**.

(4) Secure the lock nut with lacquer.

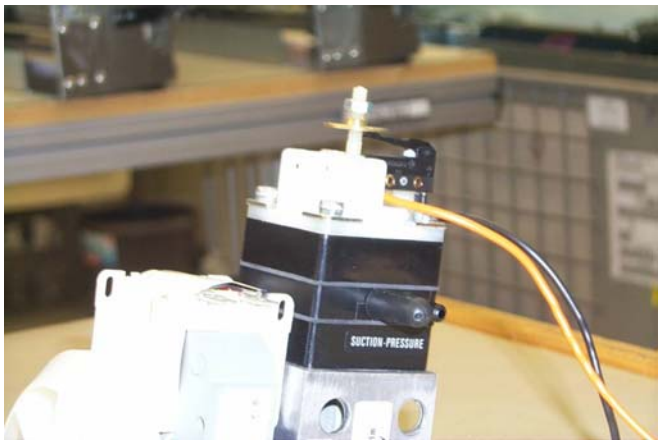



Figure 25

### 4.1.3 Finishing the Adjustment

(1) Disconnect ohmmeter and vacuum tester
(2) Install the vacuum pump in reverse order as described above
(3) Close the doors
(4) Start the digitizer
(5) Execute a test cycle